

The North Rupununi Adaptive Management Plan (NRAMP)

2006

Darwin Initiative Guyana Partnership

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Conservation and Development
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The structure of the North Rupununi Adaptive Management Plan (NRAMP)

The General Concept

The plan being proposed for development will not be one that is expert lead, as has been practiced in the recent past. In other words, the Darwin Initiative project will not be setting goals to be implemented by the various stakeholders. Conversely, we will be recommending a management plan that engenders participation of stakeholders in setting their own goals for managing the North Rupununi wetland. The plan will therefore be the result of interactions among the various stakeholders which will involve negotiations, conflict resolutions, compromise and consensus to arrive at the goals which are appropriate for all involved. This allows the stakeholders to ensure that their interest and agendas are represented in the plan set.

A critical component of the plan will be a process which allows it to be adaptive in all regards.

We would like to propose that the NRAMP is part educational (capacity building), a database, and a management plan (mostly focusing on a process of stakeholder engagement and the development of a shared understanding).

Format of the NRAMP

The NRAMP will be produced in a paper format, although we do have plans to eventually integrate the ECOSENSUS material and processes so that the NRAMP will be available on-line.

We would like to propose that some sections of the NRAMP be written in the form of a conversation between stakeholders. To illustrate the idea, for example, when presenting context information on the communities, one of the community members will be 'talking', and their cartoon picture will appear next to the section. If there is information being presented on the way data was collected, one of the Wetlands Team will be 'talking'.

We also hope to use various pictorial representations in the NRAMP as 'sign-posts' to the reader.

General outline of the plan (Envisaged)

- 1. Executive summary**
- 2. Context**
 - a. The process by which the project was developed and the capacity building activities that occurred as part of the project (aspects taken from State of Rupununi report).
- 3. The Management Process**
 - a. This is a four phase process that has formed the core of the adaptive nature of the plan. (the non-linear aspects of process in early stages)

- b. The phases of the process are proposed as follows:
- i. *Phase 1 – Making sense of the situation* – This phase involves collating information e.g., what information do we have on the North Rupununi as it relates to managing the resources? What additional information needs to be collected? How do we collect it, and how do we analyse it?
 - a. Ecological monitoring – to characterise wetland types using biophysical factors and ecological criteria.
 - b. Social monitoring – to characterise the socio-economic and cultural factors i.e. to provide a context for human use and interaction with wetlands. This includes demographic descriptions, livelihood uses, institutional arrangements and resources available.
 - c. Wetland socio-ecological health – to provide indicators of wetland socio-ecological health.
 - ii. *Phase 2 –Evaluating the information, and identifying problems and opportunities* – from an analysis of the information against a set of social and ecological criteria, stakeholders will be able to identify problems and opportunities within the current situation or which may emerge in the future if current trends continue. The selection of criteria and thresholds will be an outcome of a negotiation process among stakeholders.
 1. Proposed criteria for social-ecological health, including thresholds
 2. Stakeholder engagement – identifying interests (prioritising criteria and establishing threshold levels), negotiation and resolving conflict to identify common criteria and threshold levels.
 - iii. *Phase 3 – Developing a plan of action* – This phase will develop potential management scenarios and capacity building resulting from a range of goals identified by the stakeholders.
 1. Developing a plan of action - identifying a common vision and sub-goals (why are we doing this?), expected outputs (what do we want to get as a result?), actions (how are we going to do it and when?), measures of progress and success (how do we know we've done it?), assumptions (what do we need in order to do it?), and responsibilities (who is going to do it?).
 - a. The plan of action should include an explicit reiteration of the process outlined above including making sense of the situation, evaluating the information and developing a new plan of action.
 - iv. *Phase 4 –Taking action and monitoring* – This phase commits stakeholders to allocating resources (this include financial, human and infrastructural) in order to achieve the selected management goals. This will also involve collecting measures of performance and monitoring activities, and committing stakeholders to a reiteration of the management process.

4. The Management Process 2003-2006

This section will describe the actual activities and outputs that were carried out and generated during the 2003-2006 period under the support of the Darwin Initiative.

1. *Phase 1 – Making sense of the situation*

- a. Development of manuals for the collection social-ecological data
- b. Building the capacity of stakeholders to monitor the social-ecological status of the North Rupununi
- c. Data collection and exploratory analysis
- d. Identifying indicators of wetland socio-ecological health

2. *Phase 2 –Evaluating the information, and identifying problems and opportunities*

- a. Comparing analysed data to a set of criteria
- b. Presenting criteria to stakeholders to prioritise, critique criteria and identify critical thresholds

3. *Phase 3 – Developing a plan of action*

- a. The vision and sub-goals etc – post-Darwin proposal

4. *Phase 4 –Taking action and monitoring*

- a. Who’s doing what and reiteration – shift of responsibilities

5. The Management Process 2006 and beyond

6. Appendix 1. List of documents and data for NRAMP

The Proposed Approach for the NRAMP

The North Rupununi Context

To be completed

Introduction

The NRAMP process can be defined by five terms: adaptive; participative; systemic; evidence based; and practical. The section below will describe what we mean by these terms.

A central aspect of the NRAMP process is its **adaptiveness**. We believe that management plans cannot be static instructions, but ought to change with changing circumstances. As a principal aim of our management plan is to improve a problematic situation, we expect things to change (hopefully for the better) as the plan is implemented. This automatically implies that we have to observe the changes that are taking place, evaluate whether these changes are in accordance with the agreed vision, plan future actions in order to support positive change or reverse negative change, and put into action the agreed plans by allocating responsibilities and resources. These steps of observation, evaluation, planning and action, can be described as a learning cycle. In other words, in order to improve the situation, we have to be able to learn about the changing circumstances and even learn from our own mistakes.

Another key element of our process is **participation**. There are three main ways one can develop and implement a management plan. The first approach is to decide for stakeholders. So-called experts are brought in to write a plan which tells stakeholders what to do. A major problem with this approach is that most experts are not "know all geniuses" so their understanding of a situation will always be limited, especially if they haven't spent a long time on site to become familiar with the local and national culture, and the local ecology. Most expert-led plans are therefore limited in their application since they usually focus on the expert's area of specialisation and rarely take into account local details. These experts often carry out a token consultation exercise with no guarantee that stakeholder views are taken into account. There is also the additional problem that as a result of Guyana's limited human resources, most of these experts are foreign. Jeanette Forte in her book "About Guyanese Amerindians" (1995) states that "Guyana has become a kind of academic mecca in natural science fields, because of the territory's extraordinary biodiversity and variety of intact ecosystems, but also in the study of indigenous peoples" (p. 2). Sometimes the driving force behind what the foreign expert does is questionable, especially when often there are institutional and personal pressures to publish research, increase research funding, and further reputation through things such as conference presentations. In many cases, all that is left for the host country is an end-of-project report which lies gathering dust on a shelf. The second approach is for experts to decide with stakeholders. This is where the experts work with stakeholders every step of the way to develop a plan that ought in theory represent a wide range of views. This approach is often a compromise between the limited time and resources available to carry out the project and the wish to engage stakeholders. The third approach is to facilitate and empower stakeholders to make their own plans. Here, the experts' opinions are not included in the plan at all, and instead the experts focus on building stakeholder capacity to develop the plan. The third approach is the ultimate aim of NRAMP. We believe that the days of top-down dictatorial control are rapidly coming to an end. Institutions and experts that promote centralised control can no longer

appropriate the necessary resources and command the required respect to implement major regional plans such as NRAMP. Unfortunately, the issue of respect is actually a major problem, where many stakeholders and individuals within stakeholder groups actually verge on the anarchic; doing as they wish and sometimes even breaking institutional and national regulations and laws. It is not rare to hear about incompetence, corruption and the embezzlement of funds. Thus, our focus on participation is a two edged sword -- convincing some stakeholders to abandon their toothless rhetoric of control, while at the same time trying to coordinate the actions of stakeholders towards constructive and selfless contributions. There is also a deeper questioning of the term "participation". Apparently open events such as stakeholder fora often result in the most powerful stakeholders pushing their agenda, while the weaker groups, usually the very individuals that depend on the natural resources for their livelihoods and survival, are not able to contribute to the decision-making process. Our process makes a concerted attempt to engage the most marginalised and promotes the explicit identification of distinct categories of stakeholders. For example, prioritising those whose essential needs (such as health, nutrition and shelter) have not been met and clarifying who will benefit or lose from any decision.

A major danger in being labelled a "nature conservation" project is the automatic relegation of the project to a special interest category, or even worst, the often justified accusation of eco-fascism which includes many Western conservation NGOs and agencies concerned solely with the welfare of rare animal and plant species. Many of these organisations have in the past promoted the exclusion of local people from areas of high biodiversity importance. Conservation areas have become militarised zones with Rangers granted powers of punishment (sometimes including the right to shoot and kill) and locals criminalised as traditional resource extraction practices become labelled as "poaching". It is recognised that powerful NGOs and agencies selectively identify environmental problems to further strengthen their position in the country. It is easy to blame local people for biodiversity loss and environmental degradation thus justifying the shift in control for local natural resource management away from local people to these NGOs and agencies. We want to make it absolutely clear here that we firmly believe that local and traditional natural resource users are an integral component of regional ecosystems. Traditional communities have often been able to arrive at a relatively balanced relationship with their environment and we aim to build on these experiences and support the maintenance of traditional and sustainable forms of exploitation. Because local communities depend on natural resources for their survival, they will be the first to feel the effects of the NRAMP process. They will also ultimately determine the success or failure of NRAMP. The aim of NRAMP is therefore to break out of the constraining focus on biodiversity conservation, and take a systemic approach to the management of the North Rupununi wetlands, including social, economic, political and health aspects. For communities that rely so heavily on local natural resource exploitation, an ecological crisis is also a social and economic crisis. We therefore aim to benefit both the ecological and socio-economic situation. Throughout this document we will be referring to this as a "socio-ecological" approach.

Although much of this introductory section has highlighted the social issues concerning the NRAMP process, we would like to emphasise that much of this process must ultimately be led by concrete facts. If you can't measure something, then you can't manage it. Thus, the process has a strong element of ecological and social monitoring which ought to provide the necessary **evidence** for supporting the plan's deliberations and recommendations. We would like to stress here that although monitoring is time-

consuming and resource intensive, without reliable information the plan will soon lose credibility and stakeholders will find it difficult to make decisions in the absence of factual evidence. Decisions in the absence of factual information may even turn out to be extremely damaging. In cases where there is an absence of information, then we propose the adoption of the "precautionary principle". Basically this means that one would follow the axiom "if in doubt, do without". Thus potentially damaging action should be avoided until more is known about the situation. One has to balance the need for a particular item of information and the resources required to collect. Significant effort must be used to identify appropriate types of information which can be collected at a low-cost and with limited training. For example, biological indicators are excellent sources of information since local people are already familiar with local species and observation often requires just good eyesight and a pen and paper! Once the information has been collected, a fundamental component of evidence based decision-making is the creation of an information system. This does not necessarily mean that it has to be computer-based. For an information system to be of use in supporting decision-making, the information must be easily compiled, provided in a format that is easy to understand and access, is straightforward to update, and any analysis which identifies cause and effect explained in clear and transparent terms. For example, if the information shows that fish populations are being exploited unsustainably, stakeholders must be able to clearly see which data supports this evidence and which criteria has been used to label the exploitation as unsustainable. The ability to focus on an appropriate scale to inform practical decision-making is also important. Data and analysis about a whole region will be of no use if problems emerge concerning a particular water body.

Finally, although the management process has been separated into four phases of observation, evaluation, planning, and action, so as to facilitate a straightforward understanding of the process, this division, in practice, is often artificial. This is especially the case when the unfamiliar process is introduced within a new situation such as the one in which Darwin UK team members found themselves in during the early stages of the project. Stakeholders unfamiliar with adaptive management planning have a tendency to instinctively mix observation, evaluation, planning and action, and sometimes naturally omit certain stages. Communication among stakeholders is also generally unstructured and informal. The type of behaviour characteristic of stakeholders is also dependent on existing capacities, resources and interests. A significant challenge is therefore to build capacity, channel resources, and promote interest for an efficient, effective and ethical implementation of NRAMP. Thus much of the initial effort has to be extended in the practical tasks of building basic capacity (such as numeracy, literacy, ICT and time management skills), making sure that resources are not channelled to meet other aims (which in the conditions typical of developing countries, diversion of resources to other seemingly more important tasks are a common occurrence), and trying to generate long-term enthusiasm and support for a process which doesn't promise immediate financial returns and is currently entirely dependent on donor funding. There is also recognition that local staff are under significant pressures: the pay is low, living and working conditions are difficult, and debilitating illnesses such as malaria are frequent. Thus expectations have to be adjusted accordingly and a certain element of flexibility and **practicality** has to be built into the process. There is also an understanding that it is easier to be incompetent, lazy and corrupt if one hides behind the anonymous veil of a stakeholder group or institution. It is much more difficult to hide if responsibilities are clearly attributed to you as an individual. Some individuals also feel powerless by the constraints set upon them by institutions. Thus a fundamental aspect of our practical approach has been to empower competent individuals to push through

positive change.

In conclusion to this introductory section, the NRAMP process outlined below focuses on individuals taking action to improve the situation. At the end of the day, NRAMP is not worth the paper it is written on if we are not able to create a concerted group of determined individuals willing to work for the benefit of the human and ecological communities in the North Rupununi, for current and future generations.

The ideal NRAMP process

This section outlines an ideal approach that one ought to try and follow. It outlines the theories and concepts that underpin the adaptive, participative, evidence based and practical approach, and describes the methods that can be used to put these theories and concepts into practice.

This ideal approach was very much at the heart of the training delivered to Darwin Initiative staff over the 2003 --2006 time frame. On the other hand, it also tries to incorporate lessons learnt over this period. Some of the training was found to be inappropriate while additional material which was not included in the training was identified as needing inclusion. The Post-Darwin project will build on this training as the capacity building will be multiplied by several orders of magnitude from the 10 or so individuals trained in the Darwin project.

Wicked problems and the North Rupununi Wetlands.

The above introduction to NRAMP and the 2006 "State of the North Rupununi Wetlands Report" indicates that we are dealing with a highly complex situation. This situation can be described as a "wicked problem". A wicked problem is something that manifests itself only as you try to engage and change it, and in doing so, the problem in turn changes; there is no definite solution that people could aim at; no case history to draw upon; no right or wrong approach to take which would make everybody equally happy; and there is no way to anticipate the consequences of people's actions. The best way to tackle a wicked problem is to constantly learn about the changing situation and adapt accordingly.

The issues that communities face in the North Rupununi are mostly related to the resources they extract from the wetlands, or the unwanted impacts of living so near to wetlands (such as malarial infections of epidemic proportions). These wetland related dilemmas, as with other types of "wicked problem", are characterised by continual change. Unlike simple problem-solving activities where the problem is well-defined and unchanging, managing North Rupununi wetland dilemmas involves continual learning and negotiation amongst the range of interested and affected parties.

Participatory action research and the learning cycle

The proposed NRAMP process is based on participatory action research (PAR). Participatory action research establishes communities of people participating and collaborating in managing a situation through a process of planning, acting, observing and evaluating. These four steps could be described as the activities one undertakes when engaging in a learning process. A major problem coordinating a community is that many stakeholders are not very disciplined in following the proposed learning process in a way

that allows other stakeholders to understand what they are doing and why. So our recommendations are that the NRAMP process should be described according to a basic level every time a new inexperienced stakeholder joins the community. Thus, this document presents two levels for the implementation of NRAMP: a basic level (level 1) and an advanced level (level 2). Our ultimate aim is to develop a large number of NRAMP levels to cater for a wide variety of capacities (from schoolchildren to experienced community leaders and government officials) and situations (from local resource management dilemmas to national policy-making).

Developing a shared understanding

The greatest obstacle to sustainable development in the North Rupununi is the absence of a shared understanding. A shared understanding can be described as the knowledge, techniques, skills, procedures and values that are held in common by a community. The more there is in common between community members, the easier it is to coordinate efforts and adapt to changing demands. A strong shared understanding plays a crucial role in the development of trust, overcoming the negative impacts of differences in power and knowledge. It provides a greater awareness of the capacity of community members to achieve certain objectives while at the same time creating a platform for interaction.

Thus a major focus of NRAMP is communication using a wide variety of media. This written document is only one form of presenting NRAMP. We have plans to develop cartoon strips, plays, videos, newsletters, three-dimensional models and exhibitions. We have also been working on developing an online multimedia decision support system. But most importantly, Darwin project staff have spent a considerable amount of time talking to people face-to-face.

Planning Level 1

Every process must start with a plan, even if this just involves a small isolated group of people with little experience of the NRAMP process. The planning phase could involve the following basic questions:

- what are the issues that we need to address?
- what do we know about these issues?
- what would we want to change?
- if the issues are clear and we have straightforward ways to change the situation, then what can we do to improve the situation?
- if the issues are unclear and we are unsure about what to do, how do we find out more about the issues and what we could do to improve the situation?
- who is going to take forward the proposed actions/enquiries and how are they going to share their results?
- how are we going to know that we know enough or that the action has been successful?
- if the issue is not resolved, what steps have we got in place to make sure that we continue working on this problem?

It is usual for this planning phase to occur during a face-to-face meeting with as many stakeholders as possible. If this is not possible, then a facilitating team could visit a range of stakeholders over a short period of time. Preferably, this facilitating team should be made up of representatives members of as many stakeholder groups as possible. At its

most basic, the team should be made up for an Amerindian community representative and a coastlander (so that the team has the capacity to engage at both local and national level).

The facilitating team's number one aim is to develop a clear and unbiased shared understanding and not to subversively favour the agenda of any particular stakeholder. As much information as possible should be made available to the NRAMP community so that clear and fair decisions can be made.

Acting Level 1

This phase is where people actually go and do something that has the potential to change the situation. Initially, NRAMP may have very little "action" i.e. impact on the ground may not happen for awhile as people spend most of the time sharing ideas and gathering information. Thus, it is understandable if the NRAMP community jumps straight from planning to observing.

Some people may argue that one is actually doing something ie acting when planning, observing and evaluating. We would actually like to emphasise here that NRAMP focuses on bringing tangible improvements to the Rupununi wetlands and the communities that depend on them for their livelihoods. So, in our case "action" does not include the " talk" element -- action is about attempting to make a real improvement on the ground -- and it should be measured in terms of, for example, recovering the populations of Arapaima, or reducing the number of children dying. NRAMP is not intended to be an "all talk, no action" process.

Observing Level 1

To be completed

Evaluating Level 1

To be completed

[Add/modify training materials from Darwin Initiative to parts of Level 2]

Planning Level 2

The Need for a Conceptual Model

As our decision-making process needs to be based on factual evidence, we need to develop a coherent framework for selecting the appropriate evidence. A common problem nowadays is information overload -- sometimes there is too much information of questionable reliability. It is often difficult to identify what is important -- a focus on a narrow discipline may also be misleading. So the first step is the establishment of a conceptual model which will help us make an appropriate selection of information and identify what is important and what isn't.

A lot of decision-making is influenced by a value system which labels economic information as the most important. Thus economic data is frequently used to represent how healthy and happy people are. If a household's income is high and if they have substantial savings or own a lot of land/livestock/consumer goods, then there is an assumption that that household is healthy and happy, and an additional assumption that

they are looking after their environment. Reality tells us otherwise. Households can be extremely wealthy, but their life can be a living hell as they seek to protect their wealth from envious neighbours, are plagued by diseases such as obesity, diabetes and stress induced heart problems, have children which are disrespectful of their parents, and have to rely on inferior shop bought goods since local resources have been overexploited or polluted.

Many people in developing countries are envious of the apparent quality of life that people in developed countries have. It is true that people in developed countries have a high income and a lot of material goods. But let's look at a typical day in the life of a family in the developed world. Both husband and wife have to work in order to pay for, among other things, the transport that they need to get to work and the house that they live in. They therefore cannot look after their own children so they send them to private care from as young as three months old. Since they spend most of their time working, they need to go to shops to buy all their needs, including food, clothes and entertainment. They have no time to exercise. They have little time to educate their children with their own value system. They have little time to resolve social conflicts so divorce rates are high. They also have no alternative to this way of life: if they lose their employment there is no way that they can survive without handouts from the state, since money is needed to do virtually anything, including feeding yourself. Many are depressed and need to take medication, or worse take legal and or illegal drugs, to make them feel better. Suicide rates are much higher in developed countries than developing ones.

Economic indicators play a dominant role at all levels of decision-making. At the individual level, it is how much you earn. At the institutional level, it is whether you are making a profit (if you are private enterprise) or whether you are delivering "value for money" (if you are a state institution). At the national level, it is the Gross Domestic Product (GDP). Success at all these levels is primarily measured in economic terms. People will apparently look up to you if you are a top earner. You will be acclaimed as a businessman if you return record profits. You are a successful politician if you sustain a growth in your country's GDP.

There is actually nothing wrong with this except for the fact that economic indicators play such a dominant role. Our aim in NRAMP is to try and find a conceptual model that balances economic, social and ecological indicators.

Developing a Plan of Action

To be completed

Introducing the logframe

Setting goals

Negotiation Process Among Stakeholders

Identifying outputs

Outlining activities

Highlighting assumptions

Assigning responsibilities

Observing Level 2

Making the Conceptual Model Come to Life -- Data Collection

To be completed using manuals

Evaluating Level 2

Identify Problems and Opportunities: Evaluation

To be completed

From an analysis of the information against a set of social and ecological criteria, stakeholders will be able to identify problems and opportunities within the current situation or which may emerge in the future if current trends continue. The selection of criteria and thresholds will be an outcome of a negotiation process among stakeholders.

Proposed criteria for social-ecological health, including thresholds

Stakeholder engagement – identifying interests (prioritising criteria and establishing threshold levels), negotiation and resolving conflict to identify common criteria and threshold levels.

Taking Action and Monitoring

To be completed

Reflecting on the Process

The plan being proposed for development will not be one that is expert lead, as has been practiced in the recent past. In other words, the Darwin Initiative project will not be setting goals to be implemented by the various stakeholders. Conversely, we will be recommending a management plan that engenders participation of stakeholders in setting their own goals for managing the North Rupununi wetland. The plan will therefore be the result of interactions among the various stakeholders which will involve negotiations, conflict resolutions, compromise and consensus to arrive at the goals which are appropriate for all involved. This allows the stakeholders to ensure that their interest and agendas are represented in the plan set.

A critical component of the plan will be a process which allows it to be adaptive in all regards.

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The Management Process 2003-2006

Phase 1 – Making sense of the situation

The approach

When the North Rupununi Wetlands project first began in 2003, it was important to ask some questions to make sense of the situation: “what information do we have on the North Rupununi Wetlands as it relates to managing the resources? What additional information needs to be collected? How do we collect it, and how do we analyse it?”

Although a number of institutions both within and outside Guyana had carried out various ecological and cultural studies in the North Rupununi, it became apparent that many of these had been one off, snapshot studies, explaining the situation in one time frame for a species or a community. There were few if any longer term regional monitoring studies that could help to form a baseline upon which future ecological and/or cultural changes could be assessed.

But what data needed to be collected? Monitoring numbers of bird species or black caiman, or recording monthly household fish consumption are all interesting and worthwhile, but what real, decision-making use could this data have? The data collected had to lie within a useful decision-making framework. Although there are various frameworks for natural resource management, it was decided that above all, health, whether it be for a person, animal, plant or wetland type, was paramount to the appropriate functioning of the ecology and the culture of the North. As such, the framework of the North Rupununi cultural-ecological wetland system, outlined in detail in Section 2, was developed. The indicators i.e. data collected, were then chosen to represent the health of this cultural-ecological wetland system. Details about these indicators, how they give you an idea about the healthy functioning of the North Rupununi cultural-ecological wetland system, and how to measure them, are given in Section 3 and in the Technical Manual (2006).

Capacity building

At the same time as making sense of what information needed to be collected, it was also necessary to understand whether there was sufficient know-how in individuals to be able to collect the information. An evaluation of skills and knowledge of the staff working on the North Rupununi Wetlands indicated that further capacity needed to be built in some key areas. Therefore, a training programme was implemented over the three years of the project, to build capacity in the following: habitat and species survey techniques; land-use type survey techniques and GPS mapping; stakeholder engagement and analysis; data analysis and GIS analysis; environmental decision-making and management plan development; and adaptive management planning (Table 2)

Table 2 An outline of the capacity building activities

| Training | Topics covered | Purpose | Form |
|--------------------|--|---|---------------------------|
| The learning cycle | The stages of observation, evaluation, planning and action within project management | To help participants understand the importance of evaluating and monitoring activities within the project and | Seminars, group exercises |

| | | | |
|--|--|--|--|
| | | changing actions accordingly | |
| Habitat, species and land use survey techniques | Wetland cultural-ecological systems, indicators of health, criteria for selecting monitoring sites, designing the field datasheet | To equip participants with the knowledge and skills to carry out ecological monitoring using key indicators | Group exercises, brainstorming, seminars, fieldwork |
| GPS mapping | Map features, locating positions | To provide participants with ability to mark significant geographical locations | Fieldwork exercises |
| Stakeholder engagement and analysis | Identifying stakeholders, their levels of power and their relationships to one another. Dealing with conflicts, concerns, values and beliefs. Identifying decision making structures, the processes of decision making and the location of key resource personnel. | To help participants identify, understand and manage the role of various stakeholders in natural resource management | Group exercises and brainstorming |
| Cultural survey methods | Semi-structured interviews, focus groups, transect walks, seasonal calendars | To equip participants with skills to be able to collect cultural indicator data | Individual and group exercises, role-playing |
| Data management | The need for good data management and how databases built to fit intended types of analyses | To help participants understand the importance of good data management | Seminars |
| Data analysis | Data verification, missing data, exploratory data analysis (summarising data in tables and graphs), analysis to inform decision-making | To equip participants with the skills to be able to carry out simple, but effective data analyses for informing management and decision-making | Seminars, individual and group exercises |
| Geographical information systems and participatory 3-D modelling | Different forms of spatial information, integrating spatial information, using spatial information to make recommendations/decisions, 3-D modelling | To equip participants with the skills to integrate spatial information in a simplified form using a participatory approach for decision-making | Seminars, individual and group exercises, group model building |

| | | | |
|------------------------------------|--|---|---|
| The process of adaptive management | Approaches to natural resource management planning, the learning cycle as a basis for adaptive management, the stages of the learning cycle in adaptive management, the logframe as a tool for adaptive management | To equip participants with the skills to be able to facilitate adaptive management in the local communities | Group exercises, brainstorming, logframe construction |
|------------------------------------|--|---|---|

Data collection

Ecological system

The Technical Manual (2006) outlines the key indicators of various cultural and ecological functions that were developed for the North Rupununi cultural-ecological wetland system. For the ecological system, these key indicators (Table ?) were monitored over a two year period, which commenced in March 2004. Sites were selected together with stakeholders from the local communities, the Iwokrama International Centre and the University of Guyana. Satellite images, resource maps and local knowledge of the area were used to identify potential monitoring sites using the criteria of waterbody type (e.g. pond that dries out, river, creek etc.) and habitat type (forest or savanna). Local and scientific knowledge identified these two criteria as potentially the most important for wetland ecological functioning. Second order criterion used for site selection was the presence of land use activities in and around the waterbodies and the accessibility of the site.

Table ? List of all the ecological indicators collected

Once a list of potential sites was compiled, a two week field trip to a total of 47 sites was undertaken. This reconnaissance trip allowed the identification of sites for monitoring, based on whether they fit the criterion and whether they were really accessible both in the dry and wet seasons. At the end of the trip, 33 sites were chosen to conduct the monitoring activities: 9 of these sites were in the Iwokrama Forest, 8 in the savanna and the remaining 16 sites along the Rupununi and Essequibo Rivers. After the first twelve months of monitoring, two sites were dropped after consideration of site representation and logistical difficulties. As such, two years of monthly data was collected for 31 sites (Table ? and Figure ?), with monitoring activities concluded in April 2006. The methodology for collecting each indicator can be found in the Technical Manual (2006).

Table ?. List of 31 ecological monitoring sites

| |
|-------------------|
| 5 Miles Swamp |
| 8 Miles Swamp |
| Airstrip Pond |
| Burro Burro River |
| Cajueiro Pond |
| Corkwood Swamp |
| Cowhead Transect |
| Crash Water Creek |
| Devil Pond |
| Diamond W |
| Dixie Pond |
| El Dorado |
| Grass Pond |

| |
|-----------------------------|
| Hunt Oil Landing |
| Iguana Pond |
| Itch Pond 3 |
| Kwaimatta Landing |
| Lake Amoco |
| Marvin Pond |
| Paddle Rock Pond |
| Pygmy Inlet |
| Rewa River Transect |
| Sand Landing River Transect |
| Semonie Creek |
| Siparuni River |
| Small Black Water Pond |

| |
|--------------|
| Stanley Lake |
| Surama Pond |
| Wagon |

| |
|-------------------|
| Yakarinta Landing |
| Yakarinta Pond |



Figure ?. Map showing the sites of ecological monitoring in the North Rupununi Wetlands.

Cultural system

The collection of cultural system functioning indicators began in January 2005 and continued until August 2006. Through a series of visits to the fifteen communities of the North Rupununi (Table ? and Figure ?), information on the livelihood and social functions indicators was collecting using a range of techniques including semi-structured interviews, focus groups, transect walks and seasonal calendars. Information on all these techniques can be found in the Technical Manual (2006). The Technical Manual (2006) lists all the cultural; indicators developed in the project – however, within the timeframe of the project and issues of accessibility to communities at various times of the year, it was not possible to collect information on all the indicators.

Table ? List of fifteen North Rupununi communities where cultural data was collected

| | | |
|------------|-----------|-----------|
| Annai | Kwatamang | Wowetta |
| Apoteri | Massara | Yakarinta |
| Aranaputa | Rewa | Yupukari |
| Crashwater | Rupertee | |
| Fairview | Surama | |
| Kwaimatta | Toka | |

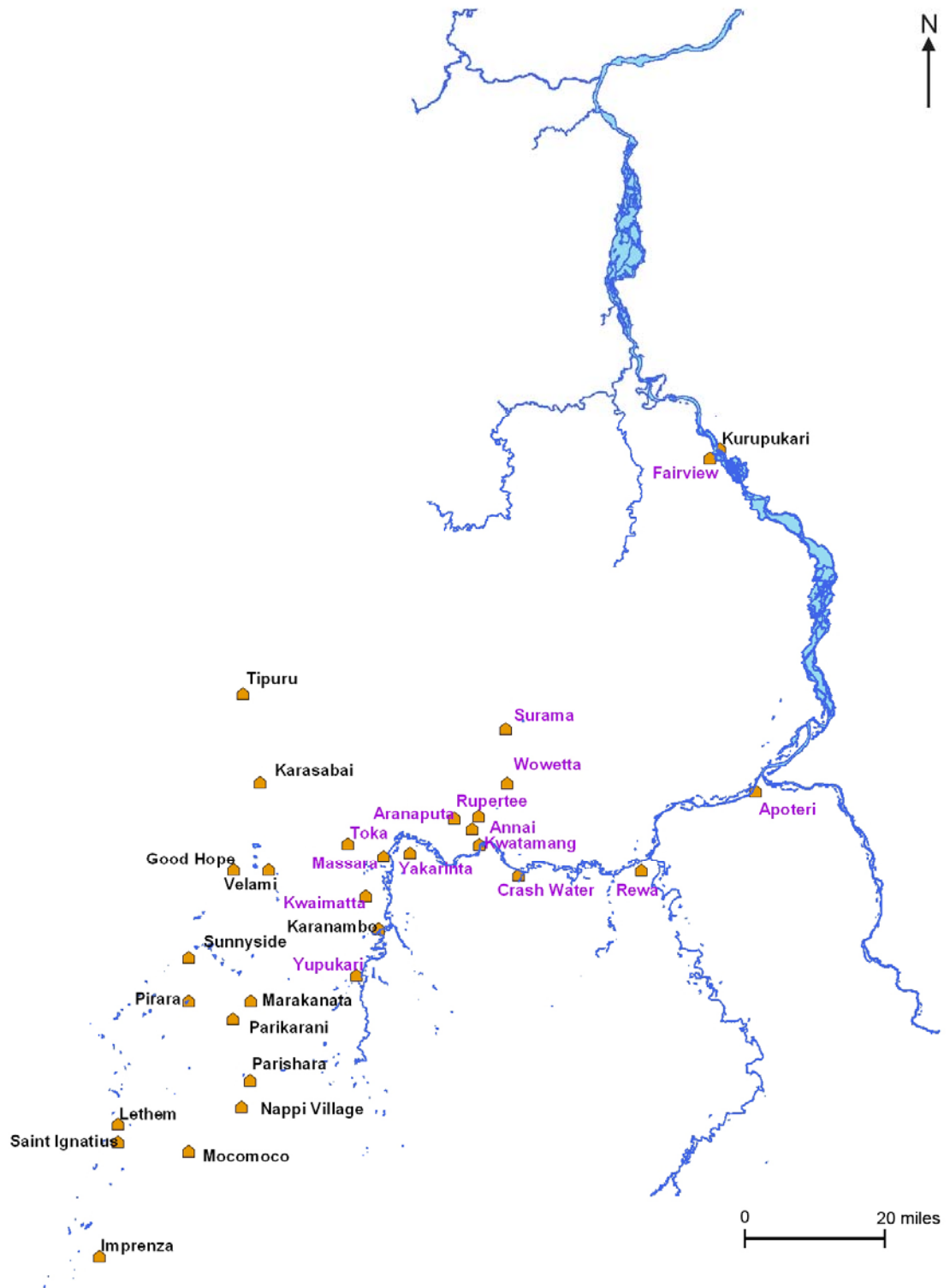


Figure ?. Map showing the villages of the North Rupununi – the villages highlighted in pink are the official villages which form part of the North Rupununi District Development Board and the sites for social monitoring in the North Rupununi Wetlands.

Table ? List of all the cultural indicators collected

Data management

It was essential to establish a database within which the information collected could be stored. For fieldwork, ecological indicator data was collected on a pre-determined field datasheet which was designed by the project staff. At the same time, a database structure was established in Microsoft Access as the electronic store of the ecological information. This was designed in a user-friendly form which allowed users to click on icons for different forms of data. It was also established in a form which would allow easy conversion to other software programmes for data analyses. The cultural indicator information was collected in the form of field notes, which were then transcribed onto an Excel database, again designed in a user friendly form allowing the user to easily input information. A system for regularly inputting information and producing backups of the electronic databases was established.

Data analysis and results

Before any data analyses could begin, it was important to verify the data collected. This was vital in order to identify any errors in data and also identify missing data points. For the latter, it was then necessary to impute or 'fill in' the missing data. The methods used for imputation are outlined in Section ? of the Technical Manual (2006).

Once imputation was complete, exploratory data analyses began. It was important to firstly establish the reasons for data analysis as this would determine the methods employed. For this project they included:

- 1) to summarise data collected on the cultural and ecological indicators in a form that would be the basis of and support further discussions on adaptive management in the North Rupununi wetlands;
- 2) to identify any patterns and trends in the data over time;
- 3) to look for relationships between different indicators;
- 4) to be able to assess the health of the North Rupununi wetland cultural-ecological system.

As such, a range of methods were used to analyse the information – these are outlined in Section ? of the Technical Manual (2006). These involved synthesizing data according to certain criterion, summarizing data in tables, and graphing data. The *State of the North Rupununi Wetlands Report (2006)* gives examples of these. For example, the cultural indicator data was synthesized according to whether they were cultural structures or processes. The ecological bird indicator data was summarised according to main habitat and maximum occurrence in wet and dry seasons and shown in the form of tables. The water depth and caiman numbers were plotted against month to show the patterns over the year.

These simple ways to manipulating the data helped to identify potential relationships between different indicators. For example, birds, one of the key indicators for different wetland ecological functions, showed differences in composition and abundance between different habitat types, namely between forest and savanna, as well as different waterbody types. Because we wanted to see the relationships between many different bird species and many other indicators (e.g. habitat, waterbody, habitat features, waterbody features), it was then necessary to carry out multivariate (multiple variables/factors) analyses. This form of analysis using specialist computer software allows the user to explore and identify the relationships between the multiple variables. It also gives an indication on the relative importance of different relationships. More details on multivariate analysis is given in Section ? of the Technical Manual (2006).

The ecological and cultural data analysis results are presented in the *State of the North Rupununi Wetlands Report (2006)*.

Spatial data analysis

The key activity here was to identify the geographical limits of the North Rupununi Wetlands. In this region there are three main river catchments: the Rupununi River catchment, the Burro Burro/Siparuni River catchment and for the areas that did not drain into the two latter catchments, the Essequibo River catchment. This was a crucial exercise, since any land use change in any of these three regions would probably have impacts on the waterbodies, their ecology and community livelihoods.

The second objective was to compile a series of useful layers for decision making. These included community locations, communication routes, vegetation distribution, flooding extent during different times of the year, and sites of significant ecological/cultural importance. Much of this information was collected during the two years of monitoring.

A major challenge was to identify a software tool which could capture, host and analyse the spatial information in a way which was relatively straightforward for project partners to use and maintain. A significant addition to the Darwin Project was the granting in August 2005 of £45,000 from the Economic and Social Research Council to develop such a system. This system is currently being developed and tested and will be operational by March 2007.

Phase 2 – Evaluating the information, and identifying problems and opportunities

Assessing North Rupununi wetland cultural-ecological health - prioritising and identify critical thresholds

Once data on the wetland cultural-ecological indicators was collected and analysed, it was necessary to set critical limits for the indicators i.e. it was important to determine acceptable and desirable limits for them. If the indicator then moved beyond the values specified for it, we would know that remedial action was required to restore system integrity and health. For example, we could set a desirable limit of fish diversity for a wetland type as 10 species and an acceptable limit as 6 species. If fish species diversity fell beneath six then appropriate remedial action would need to be taken to restore system integrity and maintain important functions, resources and services.

For the North Rupununi ecological system a series of reference state functional signatures, each functional signature comprised of a suite of indicators, were developed from the data analyses for the different types of habitat waterbodies. These reference state functional signatures represent the level and type of ecological functions that should be performed within a 'healthy' system and are outlined in detail in Section ? of the Technical Manual (2006). The setting of limits – performed to a high degree, performed, not performed - of the ecological indicators came about through the analysis of the data collected. However, it is recognised that there needs to be in-depth consultation with stakeholders on ensuring that there is common agreement on these ecological thresholds. This will be undertaken in the next iteration of the adaptive management learning cycle (see Section ?). Here we present the provisional reference state functional signatures for the different waterbody types of the ecological system (Table ?).

For the cultural system, two functions were identified in the Technical Manual (2006):

- Livelihood support function – the livelihood support function includes aspects of nutrition and health attributed to the North Rupununi wetlands.
- Social function – this includes aspects of security (e.g. land tenure), belongingness (e.g. identity and sense of place) and self-esteem (e.g. pride and self reliance) attributed to the North Rupununi wetlands.

Within the timeframe of this project and the cultural data collection that took place, it was not possible to collect data on all the indicators of these functions. In addition, although it is relatively straight forward to set health thresholds for ecological systems, cultural health thresholds are heavily reliant on the values, norms and beliefs of people. For example, what are the acceptable levels of nutrition in the North Rupununi or what is the acceptable proportion of time spent being ill with malaria? Since it is up to the communities to a) decide which functional indicators are of significance i.e. ranking and prioritising indicators, and b) to decide what the thresholds are, it has only been possible to transform the raw data collected into modes which can support discussions. These are presented in the *State of the North Rupununi Wetlands Report (2006)* and will form the basis of further discussions with the communities and the establishment of thresholds. Section ? of this document provides an outline of how these cultural thresholds can be established, and the next iteration of the adaptive management learning cycle (see Section ?) will put threshold setting into action.

Overall, the data collected indicates that the ecological functions of the North Rupununi wetlands are being performed in the manner in which would be expected for the different waterbody types. The *State of the North Rupununi Wetlands Report (2006)* also highlights that the communities living in the North Rupununi are still heavily reliant on natural wetland resources for their livelihood support and social functions. In addition, the data suggests that there is significant potential for improving the livelihood support and social functions. For example, although there is a high diversity of animal species of tourism potential, ecotourism activities are still in their infancy within the North Rupununi.

Stakeholder engagement – identifying interests

Engaging with a range of stakeholders with an interest in the North Rupununi wetlands was a core activity in the project (see Table ? for list of stakeholders). This helped to understand who the stakeholders were, their levels of power, their relationships to and with one another, as well as identifying decision-making structures, the processes of decision making and the location of key resource personnel. This was done through a number of ways and included:

- 1) regular one to one meetings with stakeholders to discuss particular stakeholder issues;
- 2) a regular project bulletin to keep stakeholders up to date with project activities and outputs;
- 3) a stakeholder forum which brought together all the stakeholders face to face for a workshop to identify problems and opportunities;
- 4) an in-depth study to look at institutional structures for wetland biodiversity conservation in Guyana. This was in the form of a Masters thesis by a University of Guyana staff member seconded to the project.

Table ? List of North Rupununi wetlands stakeholders in Guyana that were consulted during the project

| |
|---|
| North Rupununi District Development Board |
| Fifteen communities of the North Rupununi |
| Iwokrama International Centre |
| Environmental Protection Agency |
| University of Guyana |
| Conservation International – Guyana |
| World Wildlife Fund – Guyana |
| Wildlife Division – Government of Guyana |
| Fisheries Division – Government of Guyana |
| Flora and Fauna International – Guyana |
| Amerindian Peoples Association |
| Karanambu Trust |
| Ministry of Amerindian Affairs – Government of Guyana |
| Guyana Forestry Commission |

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One of the main outcomes of these stakeholder consultations was the unanimous agreement between the different stakeholders that the North Rupununi District Development Board (NRDDDB) and the local communities should have the central role of management and governance of the wetlands in the North Rupununi. Other stakeholders, such as the Iwokrama International Centre and the Environmental Protection Agency would play a supportive, advisory role –lack of resources (human, technical and financial) is the main problem for these institutions for the day to day management of the wetlands.

More focused consultations with the NRDDDB and local communities identified livelihood sustainability and security, economic activities and increased education and awareness of wetlands as some of the benefits that could come out of the North Rupununi wetlands project. In addition, they identified the need for more information on the wetland cultural-ecological system such as wetland functioning and land use and ownership. The aspect of education, awareness raising and further capacity building were particular issues identified by all the stakeholders.

Over the course of the project, the Ministry of Amerindian Affairs has also been involved in developing guidelines for community based natural resource management in the North Rupununi. This has led to the proposed establishment of a natural resources management unit in the North Rupununi called the Payakiita Resource Management Unit (PRMU) which will be linked to the existing NRDDDB by virtue of a shared chair. An important point to note here is that the PRMU specifically focuses on supporting decision making within the titled communities of the North Rupununi. The area covered by these communities is only an extremely small fraction of the North Rupununi Wetlands which includes the catchments of the Rupununi, Burro Burro, Siparuni and Essequibo rivers. Also, there are a much wider range of stakeholders involved in the management of the North Rupununi Wetlands, including non-titled Amerindian communities within the North Rupununi region, Iwokrama International Centre, Karanambo Trust, Conservation International and the communities living in the South Rupununi who can have a significant impact on the Rupununi River downstream if they put into place major land use changes. Thus NRAMP focuses on a much greater scale and greater mix of stakeholders than PRMU. However, all stakeholders, but particularly the NRDDDB and local communities recognise the need to coordinate PRMU requirements and outputs with the outputs of the North Rupununi wetland project.

Phase 3 – Developing a plan of action

Evaluating the data collected as well as the interests of the stakeholders allowed the project to establish goals identified by the stakeholders as the focus for further action. These goals are based on the realisation that although the project helped to collect essential baseline information on the North Rupununi cultural-ecological wetland system, further information and capacity building was essential if the NRAMP process was to be effectively implemented. The goals set by the stakeholders were the following:

- 1) to establish thresholds for the cultural-ecological function indicators identified in the first phase of the project;
- 2) to significantly expand the number of trained individuals in biodiversity monitoring and management;

- 3) to develop material for Guyanese university courses and schools to help raise awareness of, and build capacity for, biodiversity conservation (providing the next generation of biodiversity professionals and active conservationists);
- 4) to develop local financially sustainable livelihood schemes, such as eco-tourism, that have a linked objective to the biodiversity monitoring and conservation of key wetland habitats important to the local communities.

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This plan of action includes an explicit reiteration of the process outlined above including making sense of the situation, evaluating the information and developing a new plan of action.

Phase 4 –Taking action

Action in the context of the North Rupununi wetlands project is defined as activities that intend to make a change. As such, the 2003-2006 management process

To be completed

The Management Process 2006 and beyond

To be completed

Appendix 1. List of resources and data for NRAMP

| Name of document or data | Description of document or data | Format | Held by | Information on ownership rules |
|--|--|--------------------------|--|--------------------------------|
| Technical Manual (2006) | Manual on wetland monitoring | Electronic (Word), paper | All Darwin Initiative project partners DEFRA, UK | |
| State of the North Rupununi Wetlands Report (2006) | Report outlining results of North Rupununi Wetlands project | Electronic (Word), paper | All Darwin Initiative project partners DEFRA, UK | |
| Community Manual (2006) | Manual on wetland monitoring for North Rupununi communities | Electronic (Word), paper | All Darwin Initiative project partners DEFRA, UK | |
| North Rupununi Wetlands Ecological Monitoring Database | Database of raw monitoring data | Electronic (Access) | All Darwin Initiative project partners | |
| Wetland cultural data for: | Files containing information on wetland natural resource use and change | Electronic (Excel) | NRDDB, Iwokrama, Royal Holloway | |
| Fishing seasonal calendars for: | Files containing information on monthly fishing locations, species caught, techniques used and fish consumed | Electronic (Word) | NRDDB, Iwokrama, Royal Holloway | |
| Community profiles for: | Files containing information on North Rupununi cultural structures and processes | Electronic (Word) | NRDDB, Iwokrama, Royal Holloway | |

| | | | | |
|--|--|---------------------------------------|---|--|
| North Rupununi Wetlands Final Report | Report for DEFRA summarising the activities and outputs of the North Rupununi Wetlands project | Electronic (Word) | WWT, Royal Holloway, DEFRA, UK | |
| An Institutional Framework to Support Multi-stakeholder Processes in the Management of the North Rupununi Wetlands | Masters thesis produced by Calvin Bernard of the University of Guyana | Electronic (Word) | WWT, Royal Holloway, University of Guyana | |
| ECOSENSUS | On-line information database and training management tool | Electronic (Moodle, Compendium, uDig) | Open University | |
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